



# *Circular Economy in waste management*

**GLOBAL ECO – CIRCULAR ECONOMY, ECO-INNOVATIONS,  
SUSTAINABILITY STUDY TRIP AGENDA**

**Castello di Gallano 2 aprile 2019**

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**(Responsible Environmental Services)**

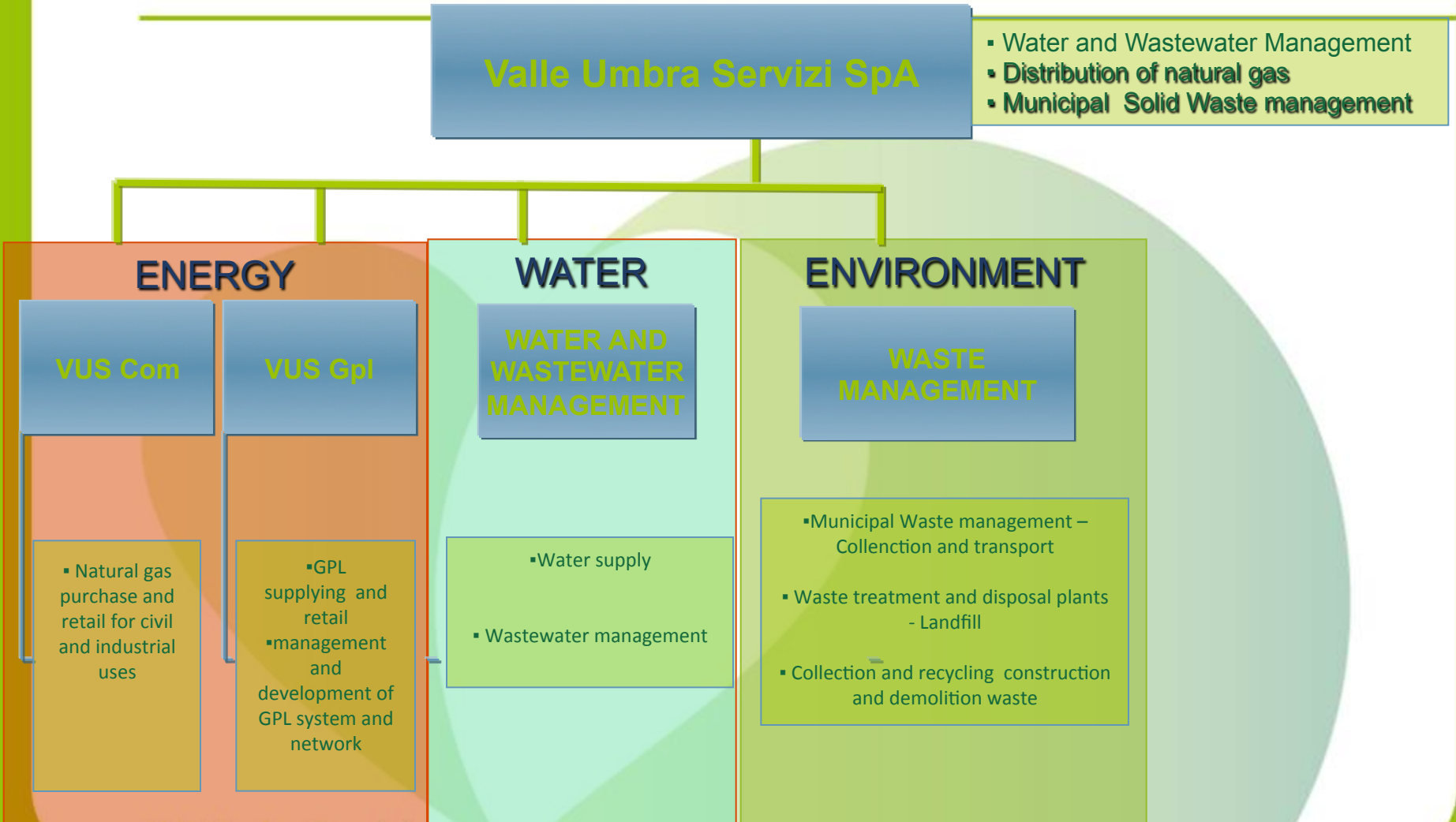


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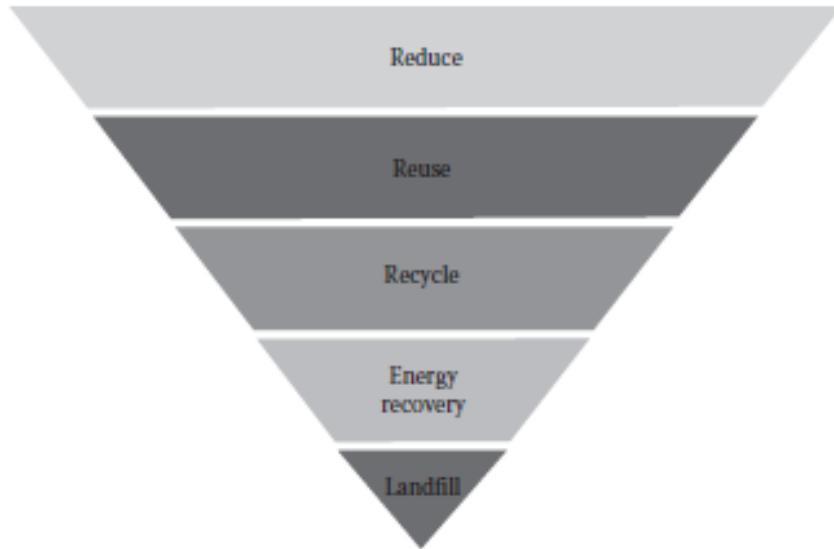
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(Material Recovery Facilyti MRF)*
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# Where and who are we?



<b>Provided inhabitant</b>	Water and Wastewater	152.311
	Natural gas	121.944
	<b>Waste</b>	<b>166.000</b>
	<b>n.22 municipalities</b>	
<b>Provided area</b>		2.200 kmq
<b>Employees</b>		<b>404</b>
<b>Networks</b>	Water	2.910 km
	Sewer pipe	864 km
	Natural gas	774 km
<b>Plants:</b>	Waste water treatment	119
	Springs, wells, reservoir	900
	Garbage dump	1
	<b>Selection and composting</b>	<b>2</b>
	<b>Collection centres</b>	<b>7</b>
	<b>Transfer centre</b>	<b>1</b>
<b>Volumes</b>	Water	12.000.000 mc
	Natural gas	106.000.000 mc
	<b>Waste</b>	<b>85.333.000 kg</b>
<b>Revenue</b>		80.000.000 €

## 2 - Integrated Waste Management System IWMS and hierarchy



Different steps in the waste management hierarchy.

**Definition:** Integrated Waste Management (IWM) systems combine waste streams, waste collection, treatment and disposal methods, with the aim of achieving environmental benefits, economic optimization and social acceptability. This will lead to a practical waste management system for any specific region.

### 3 - Separated Collection and transport

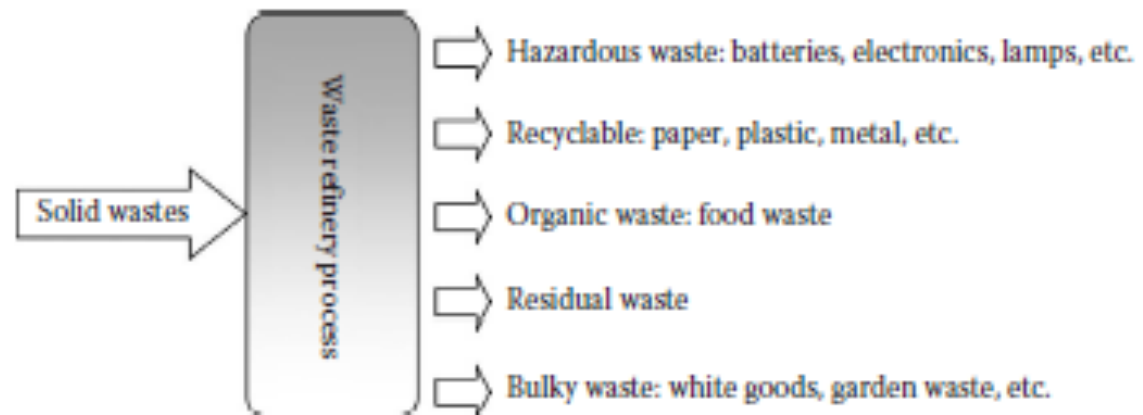
(Solid waste collection is an exercise in reducing entropy)

## The Objective of Separate Collection

### Local law DGR n. 34 - 2016 UMBRIA

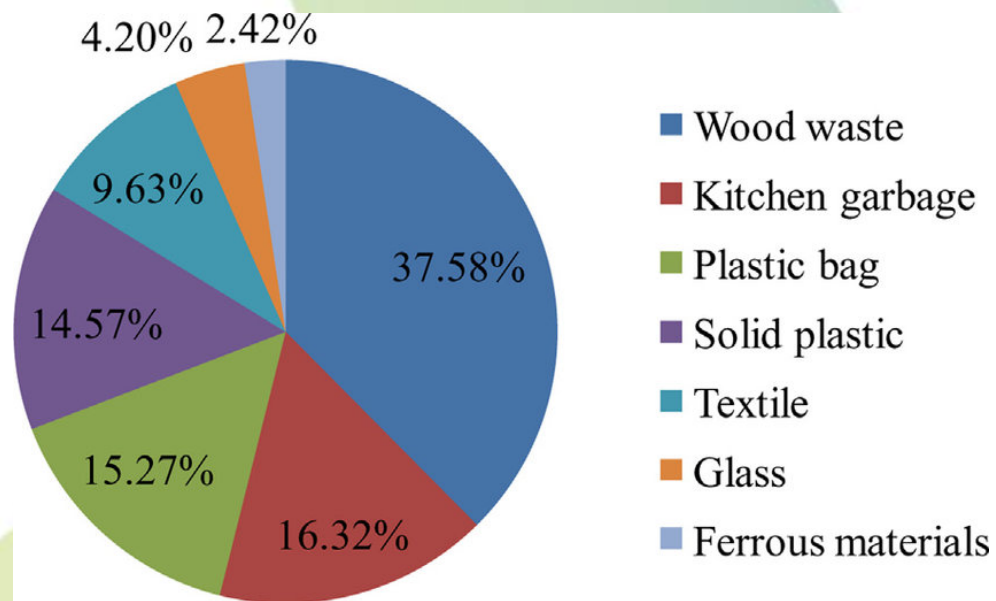
- **65% nel 2018**
- **72,3% nel 2020**

The scheme of separation in waste refinery process.



# Separate Collection door to door

- % Separate collection n.22 municipalities: 53%
- % Foligno 62 %
- Organic Waste Fraction : **tonn/y 18.000**



# 4 - Recovery Organic Fraction of Waste OFW (Compost-fertilizer and Biomethane)





# New Foligno Biomethane plant



**Size plant**

**500 Sm<sup>3</sup>/h biomethane**

**Waste quantity**

**OFMSW: 40.000 t/y  
Wood waste: 13.500 t/y**

**Output products**

**Biomethane: 4 mln Sm<sup>3</sup>/y Fertilizer: 10.000 t/y**

**Processes**

**Anaerobic digestion – Composting - Upgrading**

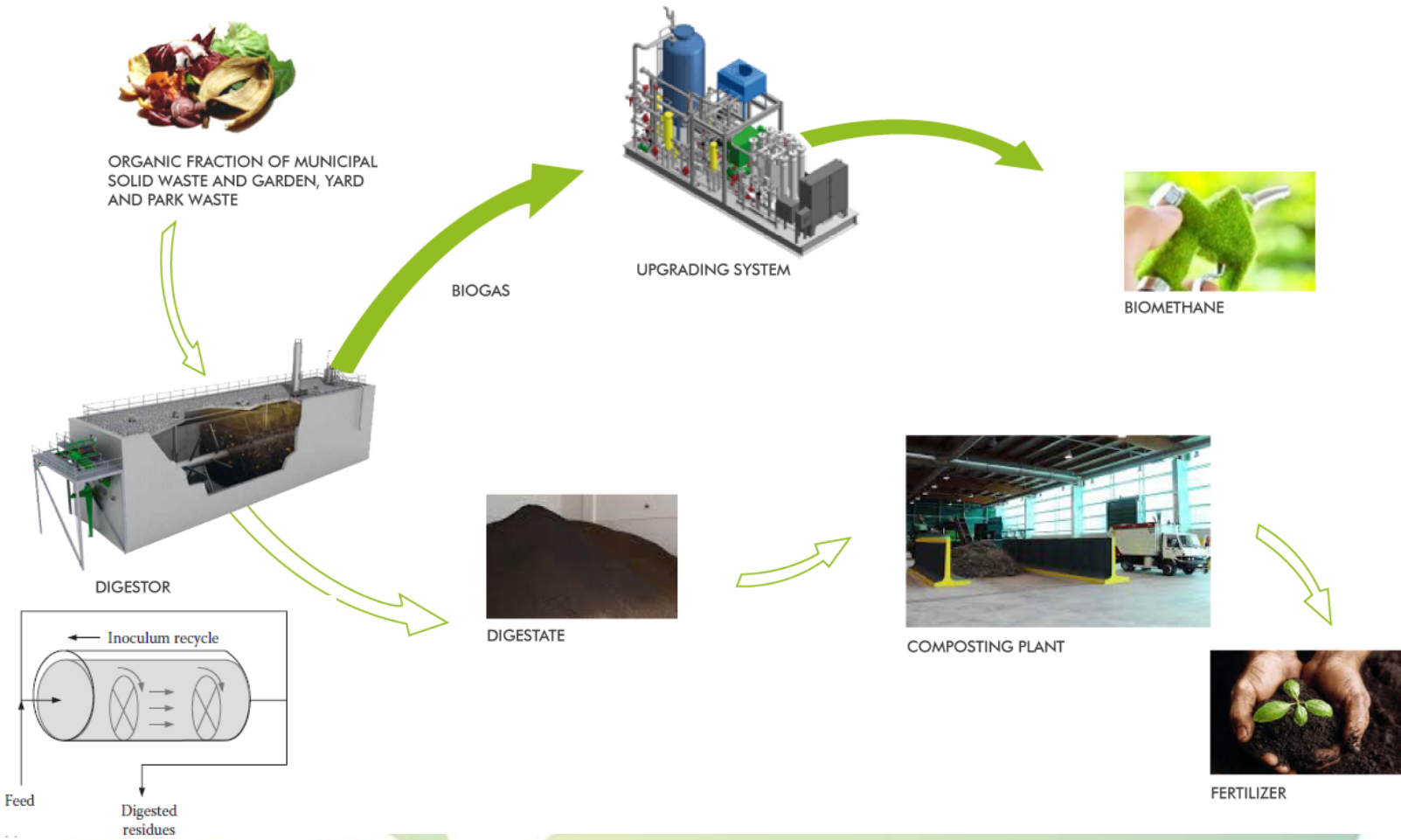
**Tecnology**  
Vare Umbra Servizi

**Semi-dry, plug-flow digestor**

April 23, 2019

*Circular Economy* **Close the loop locally**

# Flow Chart



# Biogas upgrading - Biomethane

**H<sub>2</sub>S removal**  
to prevent  
corrosion and  
and avoid toxic  
H<sub>2</sub>S concentration

**water removal**  
to avoid  
accumulation  
of condensate in  
the gas line

**Upgrading  
biogas  
system**

**CO<sub>2</sub> removal**  
to concentrate the  
energy content of  
biogas

**Ammonia  
removal**  
they are  
contaminants

**Biomethane** is chemically identical to natural gas which is stored deep in the ground and is also produced from dead animal and plant material. Therefore it can be used for the same applications as natural gas. It can be used for electricity generation, water heating, space heating, cooking as well as to fuel vehicles.

Natural gas is classified as fossil fuel, whereas biomethane is defined as a green source of energy.

**Starting in June 03, 2018**



# *5 - Recovery Dry Fraction of Waste DFW - Paper, plastics, glass.. (Material Recovery Facility MRF)*

**New project plant in  
2019-2020**



## 6 - (Circular Economy in Disaster Management) Emergency following the 2016 earthquake in the Umbria region (Italy): from problem to opportunity of development

### Objectives

The Policy Directive set the following criteria and objectives for recovery:

- 1) Containment and qualification of demolitions
- 2) Promotion of the recovery and re-use of inert materials contained in rubble
- 3) Sorting and recovery of valuable building materials present in the rubble



April 23, 2019

*Circular Economy Close the loop locally*

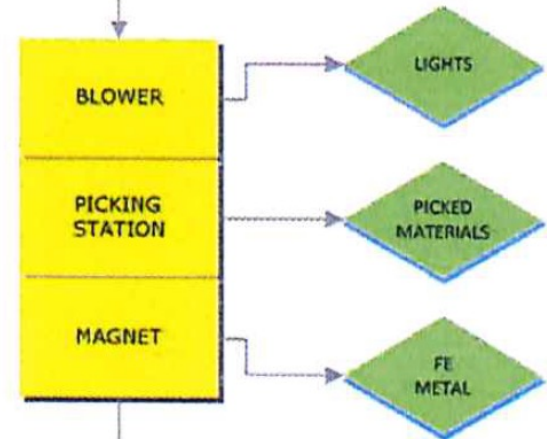
# Circular Economy in Disaster Management

## The production process of selection, treatment, and recover

It is important to divide the material in three flux of matter: *reusable stone*, *light fragment (paper, plastic, wood, soil..)* *metallic e non metallic fragment*

The steps common to the protocol of the various treatment are as follows:

- Crushing (it can be primary or secondary)
- Classification
- Screening
- Storage
- Quality control (in conformity with CE)





# *Circular Economy in waste management*

Thanks for your attention

*Daniela Riganelli*